

ISM Researcher Finds Ways To Prevent Mine Fires, Explosions.



by Ashis Sinha



“How to reduce the risk of fire and explosion in mines and improve overall safety”– the findings of the study that was carried out by a team led by Devi Prasad Mishra, a professor of Mining Engineering Department of IIT-ISM may help in a big way.

Mishra, an Associate Professor of Mining Engineering Department of IIT (ISM) has conducted research on pulverized coal which can help to increase the safety of coal mines from the perspective of spontaneous combustion and explosion and risk management of coal mines.

The outcome of research titled ‘Physico-Chemical Characteristics of Pulverized Coal and their interrelations- a spontaneous combustion and explosion perspective’ can also have applications with regard to safety and risk management of process industries and utilities sector dealing with pulverized coal.

The research project worth Rs 21.45 lakh, funded by Science and Engineering Board of Department of Science and Technology (DST) has been conducted by Dr Mishra as a team in association with a faculty of Mechanical Engineering Department of IIT (Madras) Dr V Raghavan from 2017-2020.

The research findings helped the team to get knowledge about the particle size, exposed specific surface area and gas adsorption characteristics of coal of various particle sizes that in turn facilitated the mine management to take appropriate measures to prevent the occurrence of spontaneous combustion, mine fires and explosion in coal mines.

The study during which vivid investigation of coal samples collected from different mines of Steel Authority of India Limited (SAIL), Singareni Collieries Company Limited (SCCL) besides the mines owned by different subsidiaries of Coal India Limited (CIL) including Bharat Coking Coal Limited (BCCL), Central Coalfields Limited (CCL), Eastern Coalfields Limited (ECL), Northern Coalfields Limited (NCL), Western Coalfields Limited (WCL), Southeastern Coalfields Limited (SECL), Mahanadi Coalfields Limited (MCL) and Western Coalfields Limited (WCL) were conducted analyzed the interrelations between these parameters from spontaneous combustion and explosion perspective.

“This research generated insightful coal characteristics data of pulverized coal which can be useful for furthering research on spontaneous combustion and explosion involving pulverized coals” said Dr Mishra whose research interest is in Mine Ventilation & Environmental Engineering; Mine Fire and Explosion; application of CFD in Mine Ventilation & Environmental Engineering; Methane Drainage, CBM, UCG, stowing backfilling with fly ash/pond ash; characterization of fly ash/pond ash.

“This research can be extended to coarser mine size coals, which are generally found in goaf (mined out) areas of underground mines, coal stacks and waste dumps and prone to spontaneous combustion” further opined Dr Mishra while highlighting the need for further research in the area.

Elaborating about the advantages of the research Dr Mishra said, “This unique study which led to better understanding of the physio-chemical characteristics of pulverized coal also revealed the variations of bulk density, specific surface area and gas adsorption characteristics of coal with particle size”.

“The relationship developed in this research can help to determine the bulk density and specific surface area of pulverized coal of known particle size” summed up Dr Mishra adding that they visited several mines across the country during the course of research to analyze the pulverized coal.